# Towards more effective mapping strategies for digital musical instruments

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Linux Audio Conference 2011

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# Commercial interest



‘Implicit communication’

# Designing a Digital Musical Instrument

1. Decide upon the gestures which will control it
2. Define the gesture capture strategies which work best
3. Define the accompanying synthesis algorithms / music software
4. Map the sensor outputs to the music control
5. Decide on the feedback modalities available,
   apart from the sound itself (visual, tactile, kinaesthetic, etc.)

*New Digital Musical Instruments: Control and Interaction Beyond the Keyboard*

**Miranda & Wanderley**

# Mapping – an overview

**"An efficiency-focused approach to interaction may no longer suffice: it needs to be complemented by knowledge on the aesthetic aspects of the user experience"**

***Easy doesn't do it: skill and expression in tangible aesthetics***

**Djajadiningrat, Matthews & Stienstra**

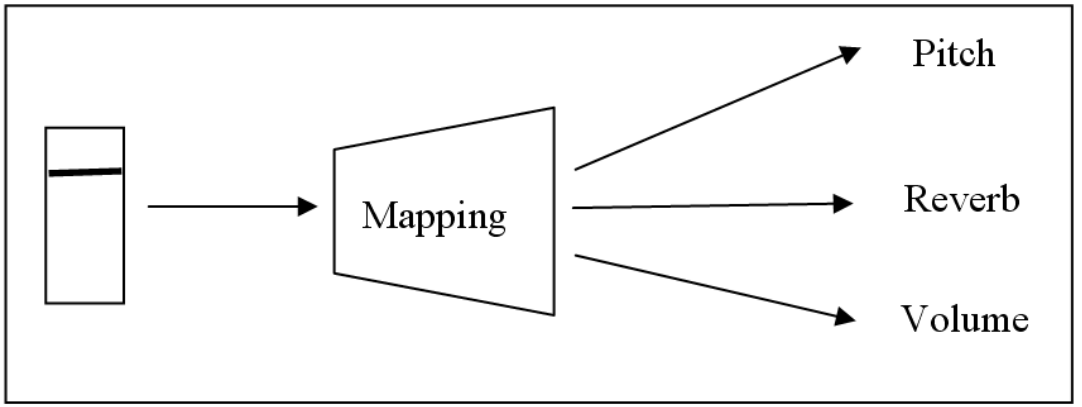
**"A more holistic performance exploration of the parameter space"**

***Radical User Interfaces for Real-Time Musical Control***

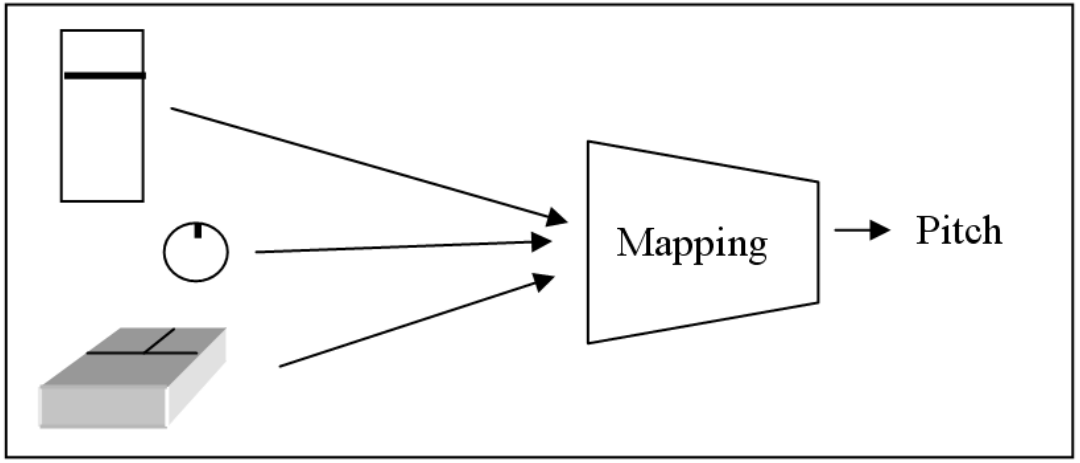
**Hunt**

# Mapping in electronic music

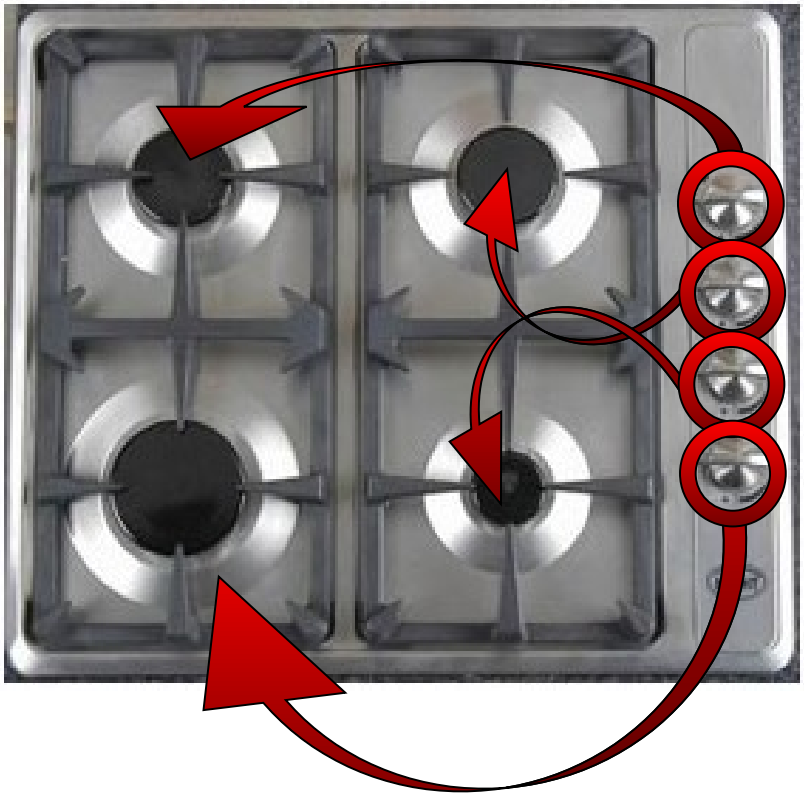
***1. Convergent***




***2. Divergent***



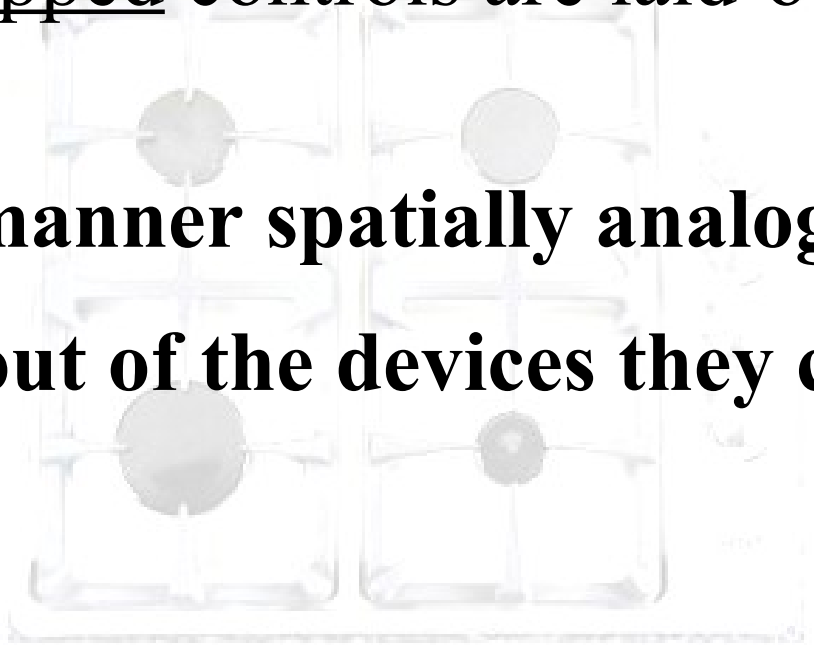
# Mapping in product design



# Mapping in product design

Naturally-mapped controls are laid-out:

**"…in a manner spatially analogous to the layout of the devices they control"**

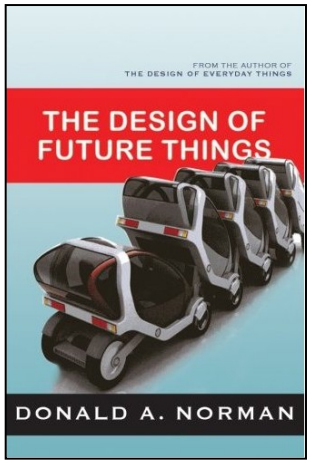


***The Design of Future Things***

**Norman**

# Mapping in product design

1. Provide rich, complex, and natural signals
2. Be predictable
3. Provide a good conceptual model
4. Make the output understandable
5. Provide continual awareness, without annoyance
6. Exploit natural mappings to make interaction understandable

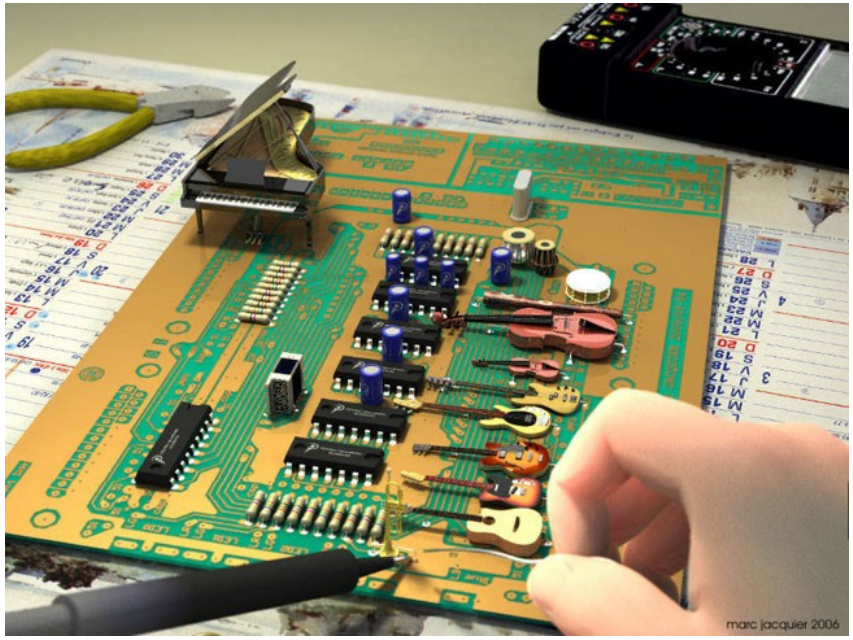



*The Design of Future Things*

**Norman**

# Systematic mapping

**Begins with…**




**A careful look at the resources available…**

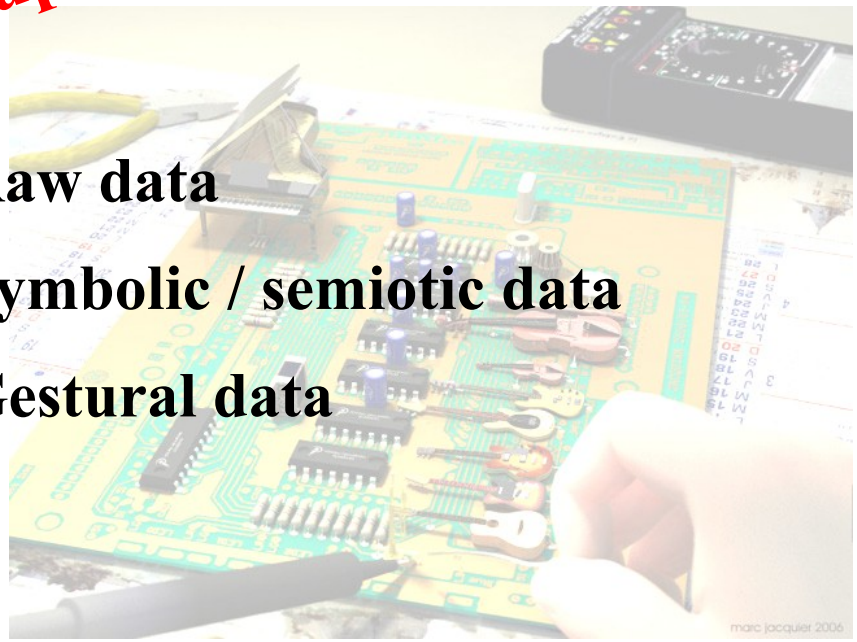
# Complexity of performance data

*Mapping groups:*

**A: Raw data**

**B: Symbolic / semiotic data**

**C: Gestural data**



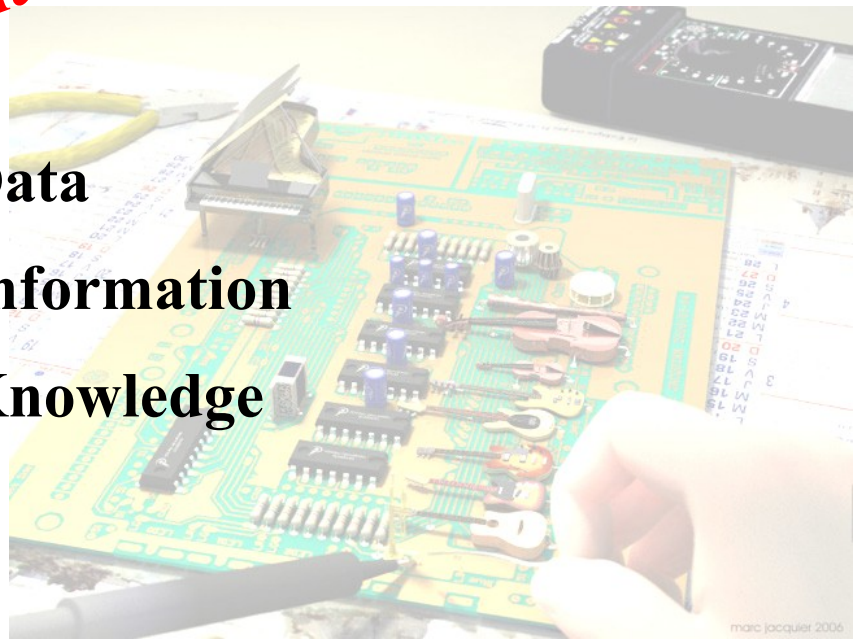
# Complexity of performance data

**Knowledge management:**

**A: Data**

**B: Information**

**C: Knowledge**



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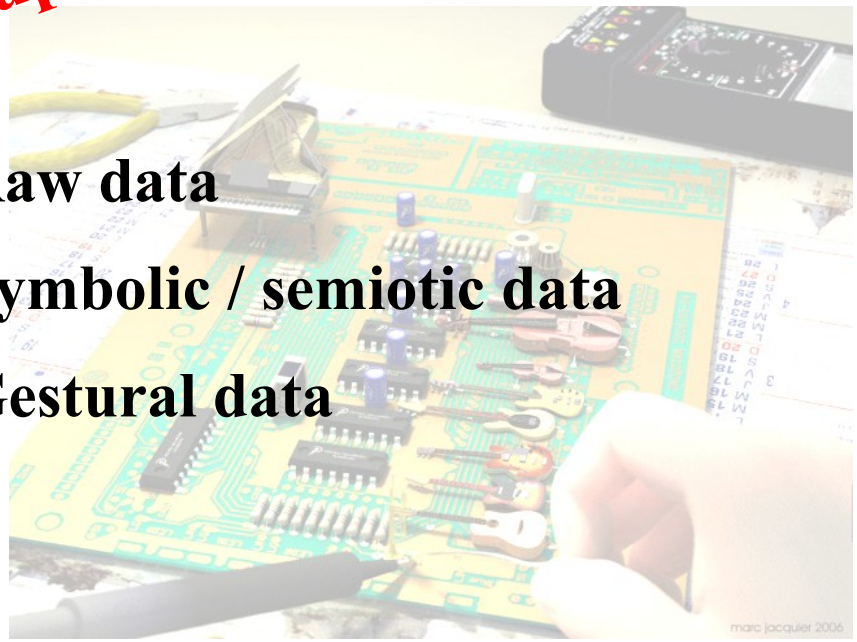
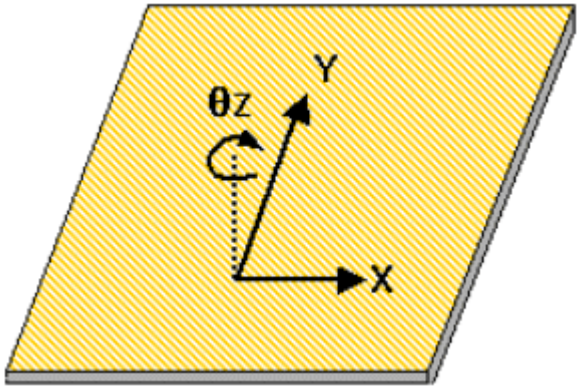
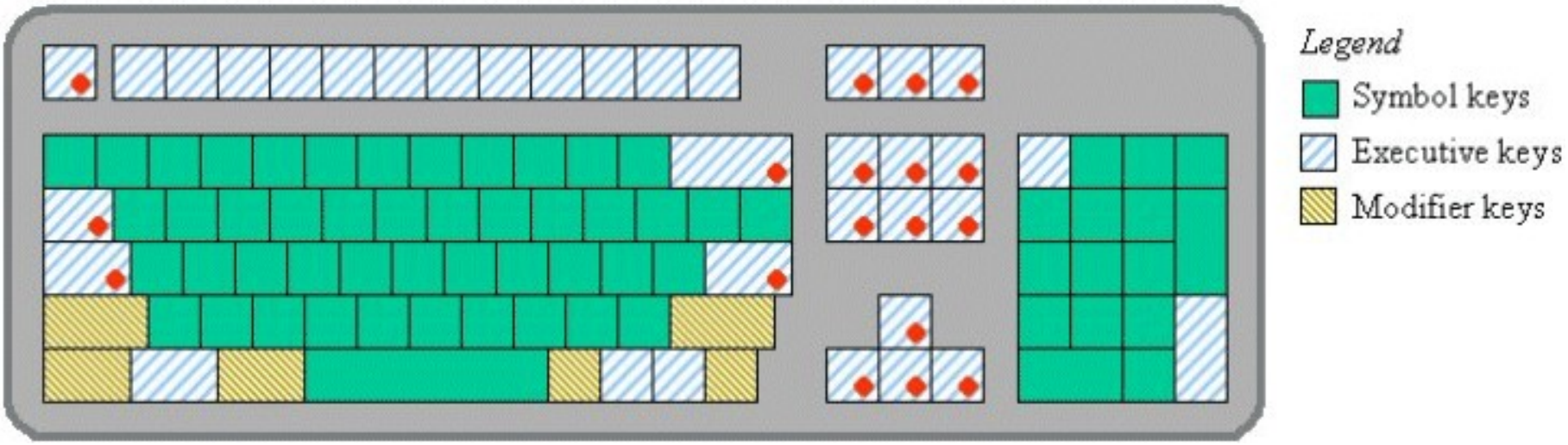


# Degrees of freedom

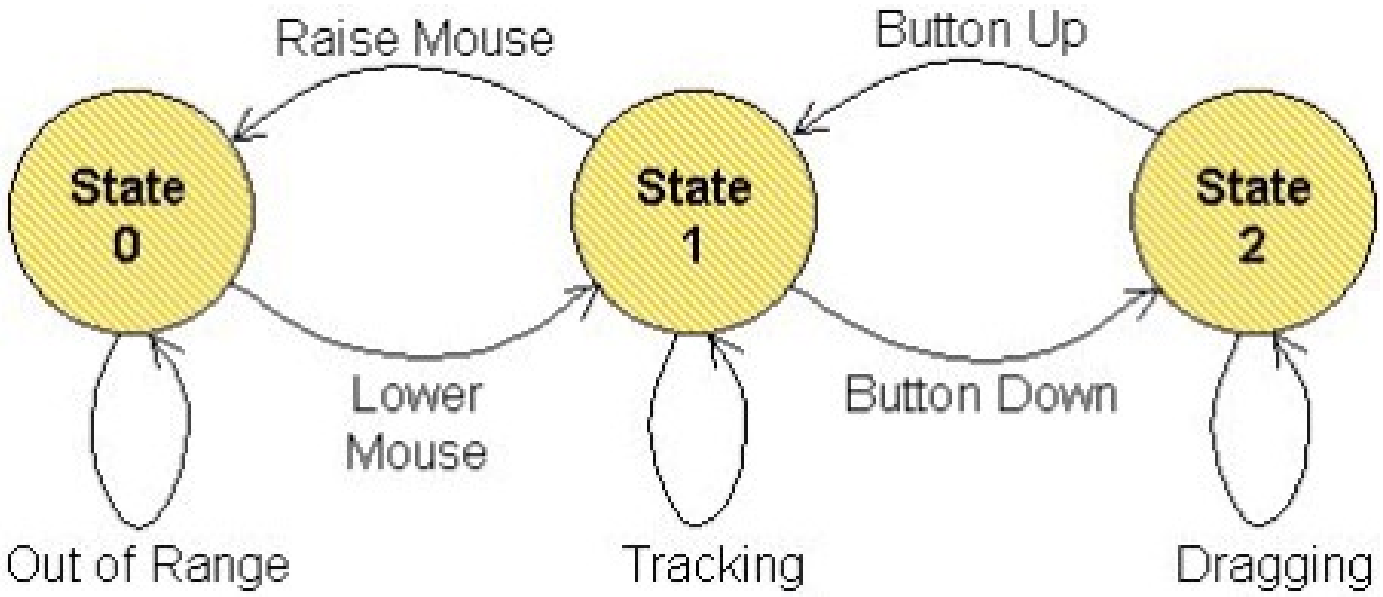



**A mousepad is a two-dimensional surface with three degrees of freedom: X, Y, and QZ**

# Combining simple control data



# Combining simple control data



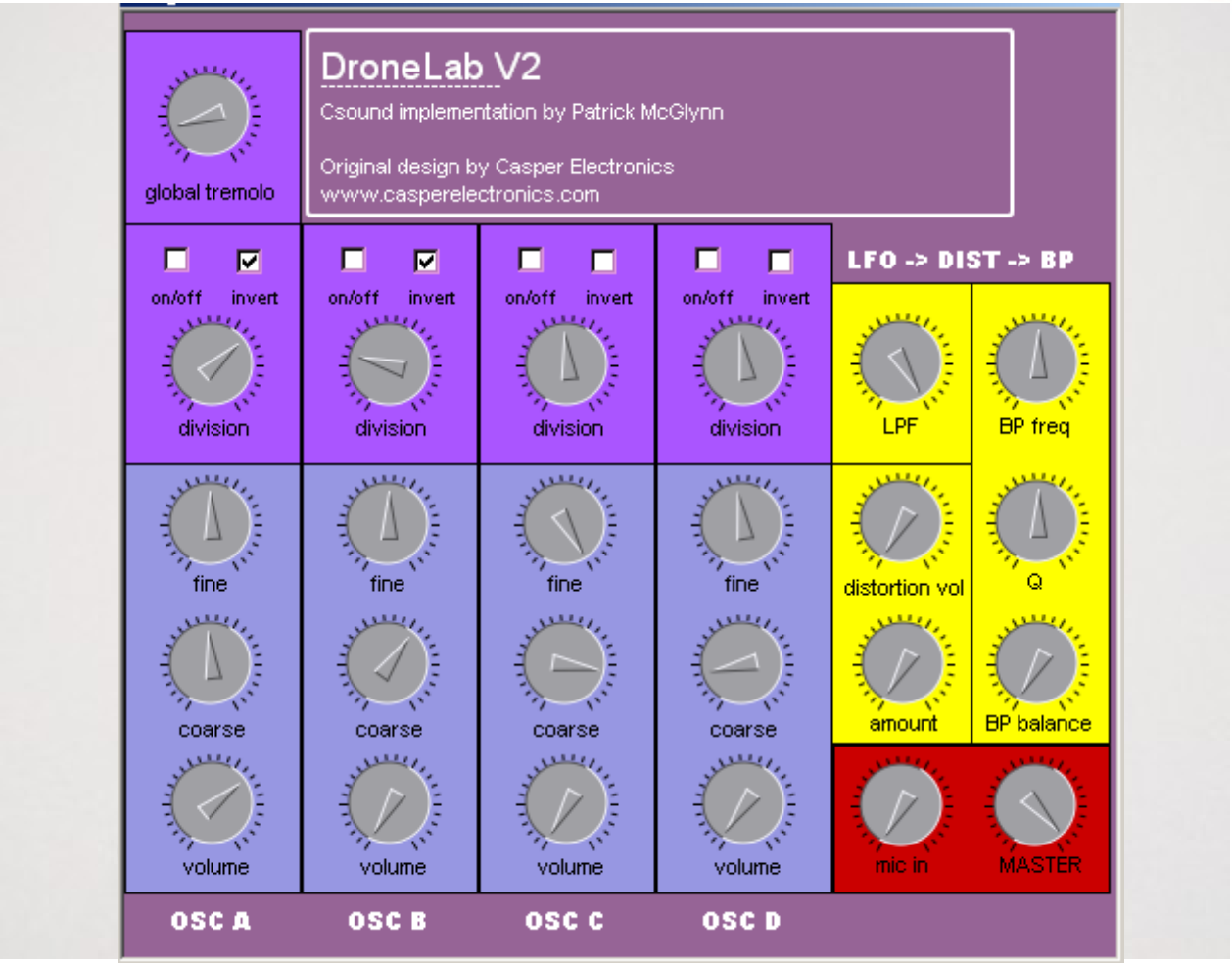

# Example application - DroneLab

CASPER ELECTRONICS

**Four-oscillator additive synthesizer, with distortion and low/band-pass filters.**

**A drone/noise machine.**

# Example application - DroneLab




(caution)

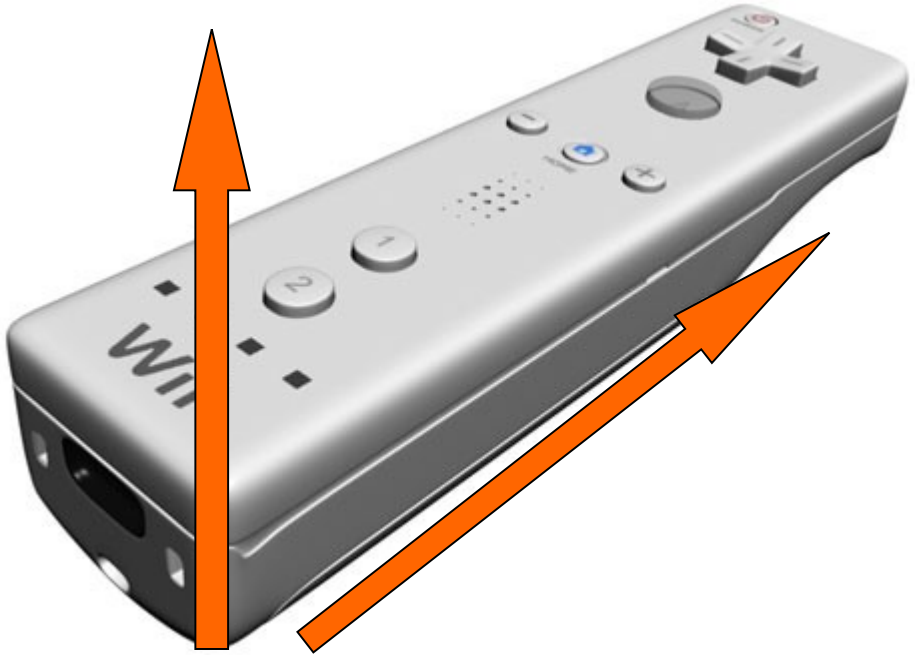
# Example application - DroneLab

# Example application - DroneLab


On/off

**Group A: Raw data**

# Example application - DroneLab



Pitch/volume

**Group B: Symbolic / semiotic**

# Example application - DroneLab


Distortion

**Group C: Gestural**

# Some thoughts…

- **The potential for a musical performance system to engage, challenge and stimulate the user depends upon how their actions are interpreted by the system.**

- **Every performance action sends information into the system.**

- **It is critical that we grasp all possible ways to interpret this data.**

# Thanks for listening!

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